

CLAIMS:

1. An apparatus for moving a door (60) of a vehicle (62) between one of two positions, the apparatus comprising a fluid cylinder (16) and piston (18) operatively connected to the door and the vehicle, the door having a first position and a second position, a supply of gas generating chemicals (24) and an initiator (26) for initiating said gas generating chemicals (24) to cause said chemicals to rapidly generate a supply of gas and to supply said generated gas to said fluid cylinder (16) to move said piston (18) between said first and second positions to effect movement of the door operatively connected thereto.
2. An apparatus as defined in claim 1 for moving the door (60) of a vehicle (62) between a first position and a second position, further including first and second linkage assemblies (27, 65) one of which interconnects said fluid cylinder to either the vehicle or the door and the other of which interconnects said piston (60) to the other of either the door or the vehicle, said first and second linkage assemblies cooperating with said door, piston (18) and fluid cylinder (16) to move said door between said first and second positions in response to initiation of said supply of gas generating chemicals (24).
3. An apparatus for moving the door of a vehicle between a first position and a second position as defined in either of Claims 1 or 2, wherein said gas generating chemicals comprises a solid chemical which when initiated rapidly generates a predetermined volume of gas in a predetermined time period which is dependent on the composition of said gas generating chemical, the volume of said gas generating chemical and the shape of said gas generating chemical.
4. An apparatus for moving the door of a vehicle between first and second positions as defined in any preceding claim, wherein said initiator for initiating said supply of gas generating chemicals (24) includes a bridge wire (80) for initiating ignition of said supply of gas generating chemicals, said bridge wire when energized

effecting ignition of said supply of gas generating chemicals (24) to rapidly generate a predetermined volume of gas to move said fluid cylinder (16) and piston (18) between said first and second positions.

5. An apparatus for moving the door of a vehicle between first and second positions as defined in any preceding Claim, wherein said source of energy for energizing said bridge wire (80) includes a piezo-electric device (90) connected to said bridge wire (80), said piezo-electric device when actuated generating a sufficient amount of electrical energy to energize said bridge wire to effect ignition of said supply of gas generating chemicals (24) to generate said predetermined volume of gas to move said fluid cylinder (16) and piston (18) between said first and second positions.

6. An apparatus for moving the door of a vehicle between first and second positions as defined in any preceding Claim, wherein said initiator for initiating said supply of gas generating chemicals (24) includes an explosive primer (100) for effecting ignition of said supply of gas generating chemicals, said primer when detonated effecting ignition of said supply of gas generating chemicals to generate a predetermined volume of gas to move said fluid cylinder and piston between said first and second positions.

7. An apparatus for moving the door of a vehicle between a first position and a second positions as defined in any preceding Claim, wherein said initiator (26) is disposed in close proximity to said supply of gas generating chemicals (24) and a device for activating said initiator, and wherein energization of said device actuates said initiator which rapidly ignites said supply of gas generating chemicals to generate a sufficient amount of gas to move said fluid cylinder and piston between said first and second positions to effect movement of the door between its first and second positions.

8. An apparatus for moving the door of a vehicle between first and second positions as defined in any preceding Claim, further including a safe and arm mechanism (32) disposed between said initiator and said supply of gas generating chemicals (24), said safe and arm mechanism including an arming member (36) having a safe position in which said arming member is interposed between said initiator and said supply of gas generating chemicals to prevent initiation of said supply of gas generating chemicals if said initiator is activated, and an armed position in which said arming member (36) facilitates ignition of said supply of gas generating chemicals upon activation of said initiator to generate sufficient gas to move said fluid cylinder (16) and piston (18) between said first and second positions to effect movement of the door between its first and second positions.

9. An apparatus for moving the door of a vehicle between a first position and a second position as defined in any preceding Claim, further including a fluid chamber interposed (110) between said fluid cylinder (16) and said gas generating chemicals for capturing and releasing to said fluid cylinder at a controlled volume and pressure the gas generated by said gas generating chemical.

10 An apparatus for moving the door of a vehicle between a first position and a second position as defined in any preceding Claim, wherein said supply of gas generated by said gas generating chemicals is inert.

11. An apparatus for moving the door of a vehicle between a first position and a second position as defined in any preceding Claim, wherein said initiator (26) includes first (28) and second (30) spaced apart portions of a readily ignitable material, said second portion (30) being disposed in close proximity to said supply of gas generating chemicals (24) and being operable to ignite said supply of gas generating chemicals when said first portion (28) of said readily ignitable material is ignited and when the arming member (36) is in the armed position.

- 12.** An apparatus for moving the door of a vehicle between a first position and a second position as defined in Claims 8-11, wherein said safe and arm mechanism (32) includes an arming member (36) having a passageway therein which provides for fluid communication between said first (28) and second portions (30) of said readily ignitable material of said initiator (26) when said arming member is in said armed position and which prevents fluid communication between said first and second portions of said readily ignitable material of said initiator when said arming member is in said safe position.
- 13.** An apparatus for moving a door of a vehicle between a first position and a second position according to any preceding Claim, in which a first position is closed and a second position is an open position.
- 14.** An apparatus according to any of Claims 1-12 in which the first position is an open door position and the second position is a closed door position.
- 15.** An apparatus for moving a door of a vehicle between one of two positions, the apparatus including a supply of gas generating chemicals, and an initiator for initiating said gas generating chemicals to cause said chemicals to generate a supply of gas and means to supply said generated gas to a rotary actuator means, wherein said rotary motion causes said door to move from a first to a second position.
- 16.** An apparatus for moving a door of a vehicle between a first position and a second position according to Claim 15, in which either the first position is closed and a second position is an open position, or the first position is an open door position and the second position is a closed door position.